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Health Care Reform: Separating Insurance from Income Redistribution

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Abstract

Most systems of health care financing in EU member states currently include elements of income redistribution. The paper analyzes the effects of shifting this kind of redistribution to the tax system and argues that this reform could create two types of efficiency gains. On the expenditure side, it would facilitate the adoption of more incentive-compatible insurance contracts, for example through the introduction of copayment schemes. On the revenue side, income redistribution through the general tax system is likely to imply a shadow price of public funds that is lower than if redistribution is carried out through wage-based insurance contributions.

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1 Introduction

The health care systems of many developed countries combine the provision of compulsory insurance with redistributive features. Redistribution through the health care system generally occurs not only from good to bad risks, but also from high-income to low-income households. Most EU and OECD member states rely at least partly on health care contributions which are related to the gross wage income of the insured person, whereas medical services received are independent of the contributions made. Hence health care financing is inextricably linked to equity issues in most current welfare systems, even though the extent of redistribution varies considerably across individual countries (see Wagstaff et al. 1999). The only example of a health care system which is (almost) free of income redistribution is Switzerland, where contributions are the same for every adult.[1]

In recent years, this "pure" income redistribution through the social security system has come under increasing pressure. On the one hand, the parallel development of private insurance schemes has offered a growing number of high-income individuals the possibility to opt out of the redistributive health care system. On the other hand, the rapidly increasing costs of health care have intensified the search for mechanisms that increase the incentives for a more economical use of medical goods and services, mitigating the fundamental free riding problem inherent in any full insurance scheme. However, attempts to offer individuals an improved menu of choices in the market for health care are severely constrained by the requirement not to impinge on the level of income redistribution that is currently carried out through health care insurance.

One obvious possibility to free health care systems from their redistributive task without reducing the overall level of income assistance to poor households is to increase the effective redistribution of the tax system. In this perspective, taxes and social security contributions are regarded as a single, integrated system. This viewpoint – which we adopt in the present paper – is not an obvious one in countries which have a long independent history of social security systems and where 'public finance' and 'social policy' have, in large parts, developed as two separate fields.

[1]Some income redistribution occurs under the Swiss system through targeted subsidies to the contributions of the very poor, which are financed from general taxation. However, total subsidies in 1997 amounted to only 2.3 billion Swiss francs, roughly 13 per cent of total contributions. See Bezzola and Martinsson (1998, p. 14) and Bundesamt für Sozialversicherung (1999).

Even in these countries, however, the strict separation of taxes and social security contributions seems to be slowly eroding.[2]

Previous contributions on the combination of taxes and social security systems have focused on the question whether social security has an additional redistributive role, given the existence of an optimal income tax system (Blomqvist and Horn 1984, Rochet 1991, Cremer and Pestieau 1996, Petretto 1999). A core result of this literature is that a case for a redistributive social insurance scheme exists if and only if low-income earners face higher health risks, on average, and thus spend a larger share of their income on health expenditures. Since social insurance works like a specific subsidy for health services, this result has a close and intuitive relation to the analysis of optimal redistribution in the presence of both direct and indirect taxation (Atkinson and Stiglitz 1976).

While this strand in the literature establishes the conditions under which a redistributive social security system can be justified from a welfare-theoretic perspective, it pays little attention to the question how the social security scheme should be financed. The above papers assume that the social insurance system is paid for either by a uniform premium (Rochet 1991) or by the income tax, but do not consider independent, wage-based contributions for health care. Furthermore, moral hazard aspects (see Pauly 1974, Arnott and Stiglitz 1986) are either not incorporated at all, or private copayments to reduce the incentive to overconsume health services are not analyzed. The only exception is Petretto (1999), but in his analysis the copayment rate is always based on an actuarially fair calculation of the insurance premium. Hence, private decisions are unaffected by income redistribution carried out through the health insurance scheme.

Meanwhile, a number of policy oriented papers and reports have focused on the moral hazard problem and have stressed the importance of alternative health care financing arrangements for an efficient consumption of health services (see Pauly et. al. 1991, Hoffmeyer and McCarthy 1994, Advisory Council for the Concerted Action in Health Care 1995, 1997). These contributions make various proposals to maintain income redistribution while increasing the role of private decisions in health care, but they do not base their recommendations on a formal economic

[2]In Germany, for example, two tax reforms in 1997 and 1999 raised the standard value-added tax rate and introduced a general tax on energy consumption, using the additional proceeds from these taxes to reduce the contribution rate for old-age insurance.

model, and do not analyze the efficiency implications of alternative mechanisms for income redistribution.

The present paper is an attempt to bridge the gap between the theoretical focus of the literature on optimal income taxation cum social insurance, and the more policy oriented literature on the reform of health care financing. We use a simple framework that abstracts from the correlation between income distribution and the distribution of health risks and takes as given that redistribution from low-risk to high-risk individuals through the health care system is desirable. Instead, we focus on the effects of shifting the task of income redistribution entirely to the tax system, combining the expenditure-related arguments for a more efficient consumption of health services with a basic optimal tax analysis that incorporates the mix of taxes and wage-based contributions characteristic for current systems of health care financing. In this framework, two distinct arguments arise in favour of a strict separation of the redistributive roles played by the health care system (redistribution between different health risks) and the income tax system (income redistribution). First, a health care system freed of its income-distributional role would facilitate the adoption of more incentive-compatible insurance contracts and thus generate efficiency gains on the expenditure side. Second, shifting income redistribution entirely to the general tax system is also likely to reduce the social costs of financing a given amount of income redistribution.

The plan of the paper is as follows. Section 2 gives an overview of existing systems of financing health care in the European Union, and comments on their redistributive effects. Section 3 analyzes the implications of alternative financing rules for the efficiency of private consumption decisions in the market for health care. Section 4 then compares the excess burden of income redistribution under a general expenditure or consumption tax versus a system of wage-based health insurance contributions. Section 5 sums up our argument and compares different policy alternatives.

2 Redistributive features of European health financing systems

To prepare the ground for the theoretical analysis in the following sections it is useful to first take stock of the extent of income redistribution involved in the systems of health care financing in the 15 EU member states. We explicitly limit the following overview to income redistribution as opposed to redistribution among different types of health risks. Every health insurance plan with compulsory membership which does not allow risk-related premiums redistributes from low-risk to high-risk members, and this is one of the main reasons for having mandatory health insurance (cf. Zweifel and Breyer, 1997, Chap. 5). But over and above this sharing of the burden of health risks, many European health care systems including all EU 15 countries shift money from high-income to low-income earners - quite independent of health risks, and this shall be the matter of concern in the following.[3]

Historically, most of this redistribution can be explained by the following development. A typical public health care scheme provides its members with two types of benefits:

(a) compensation for lost earnings in case of sickness,

(b) reimbursement for the costs (or direct provision) of medical care.

In Germany, for example, when Bismarck introduced the sickness fund system in 1883 earnings compensation constituted a major part (around 50 per cent) of total sickness fund expenditures (cf. Frerich and Frey, 1996, p. 102). Since the amount of compensation was roughly proportional to the level of earnings, the system of earnings-related contributions met the criterion of equivalence between contributions and benefits, at least for the corresponding share of contributions. Moreover, prior to the introduction of the sickness fund law, physicians had been used to charge fees according to the incomes of their patients; hence, the monetary value of part (b) of health insurance initially also increased with the income of the insured.[4] Over

[3]Income-related contributions also imply a redistribution from small families and double income earners to large families with only one income earner. We do not attempt to isolate this additional redistributive effect in our analysis here.

[4]Huerkamp (1980, p. 362) quotes the obligation of physicians in the German Reich in the 19th

time, however, the consumption of medical care increased enormously, reflecting the massive technological progress in medicine. At the same time, the duty to provide earnings compensation was shifted to employers, causing the mix of benefits provided to change more and more towards type (b).[5] This has changed the character of the health care financing system away from the principle of equivalence and towards a redistributive scheme.

Two further remarks can be made. First, the official policy language distinguishes between two types of sources through which health care systems are financed: contributions and taxes. In the traditional public finance literature, two criteria are used to discriminate between these two types of financing schemes:

1. contributions are earmarked, whereas taxes are not,

2. from the point of view of the payer, contributions generate a claim to benefits, whereas taxes do not.

While the first distinction makes sense in the field of health care, the second does so only in a very restricted way. In principle, only those people are insured who pay contributions, but the level of benefits (except earnings compensation) does not vary with the level of contributions. Secondly, several countries (Belgium, Ireland, Portugal, Spain, U.K) levy a comprehensive social security contribution which can not easily be separated into different branches. This is one of the reasons why it is impossible to compare the 15 EU member states with respect to the contribution rates to the public health care systems – in some cases they are simply not available.[6]

Correspondingly, the following comparison is more focused on the structure than on the quantitative extent of income redistribution in the EU 15. Table 1 provides an overview, which is based on two data sources with some differences in their answers to specific questions, viz., the annual report of the European Commission (MISSOC 1998) and the paper by Wagstaff et al. (1999), which covers 11 of the

century to treat all patients without regard of their ability to pay. For a more general treatment of price discrimination in health care, see Kessel (1958).

[5]Since 1970 German employers, for example, have to pay 80-100 per cent of regular earnings during the first six weeks of sickness. As a consequence, the corresponding share of sickness fund expenditures has gone down to 6.7 per cent in 1995 (Statistisches Bundesamt, 1998, p. 443).

[6]A further complication is that blue-collar and white-collar workers have to pay different contribution rates in three countries (Austria, Italy and Luxemburg).

Table 1: Financing of health care in EU member states (1998)

	contributions (C) vs. taxes (T)*	annual earnings ceiling for contributions (ECU)	earnings ceiling for compulsory membership (ECU)	other exemptions (e.g. self-employed)
Austria	C, T	36,252	none	yes
Belgium	C, T	none	none	yes
Denmark	T	n.a.	n.a.	n.a.
Finland	T, C	none	none	no
France	C, T	none	none	yes
Germany	C, T	38,253[a]	38,253	yes
Greece	C, T	20,160	none	yes
Ireland	T, C	30,053	none	no
Italy	C, T	20,597[b]	none	no
Luxembourg	C, T	68,105	none	yes
Netherlands	C, T	27,934	27,934[c]	yes
Portugal	T, C	none	none	no
Spain	T, C	28,153	none	yes
Sweden	T, C	none	none	no
U. K.	T, C	none	none	no

* dominant source of financing is given first

[a] West Germany (former FRG)

[b] no earnings ceiling for white-collar workers

[c] additional insurance for "large risks" with lump-sum contribution compulsory for all

Sources: European Commission (1998), Tables II, III; Wagstaff et al. (1999), Fig. 1.

15 EU countries. In the first column, the sources of financing are stated, and when there are two (contributions and taxes), the dominant source is stated first.

Despite some ambiguities, the following general statements seem to be warranted:

1. All countries except Denmark (which has exclusive tax financing) use both contributions and taxes to finance national health care. Six countries (Finland, Ireland, Portugal, Spain, Sweden and the U.K.) have taxes as the dominant financing source, whereas the remaining eight countries rely mostly on contributions. Tax financing clearly makes the system more redistributive, at least insofar as the main tax basis is income: the tax system covers all income sources, has no ceiling and is typically progressive.

2. Contributions are levied on total earnings without a ceiling in six countries (Belgium, Finland, France, Portugal, Sweden, U.K.). In Italy, a ceiling applies only to the earnings of blue-collar workers. In general, the higher is the income ceiling, the more progressive is the health care financing scheme.

3. Only Germany and the Netherlands have earnings ceilings by which compulsory membership is limited. Persons with earnings above these ceilings (and their families) can become voluntary members of the social health insurance system in Germany, but not in the Netherlands. Voluntary membership tends to reduce income redistribution as it allows high-income earners to enter the system if they find this in their own interest. This may occur when they face high health risks or when they have large families and non-working spouses.

4. Categorical exemptions from mandatory membership, which refer to the self-employed or civil servants, can be found in eight countries (Austria, Belgium, Germany, Greece, France, Luxembourg, the Netherlands and Spain). To the extent that these are high-income groups, the exemptions may be interpreted as lowering the extent of redistribution. On the other hand, as non-labour income is not burdened with contributions, including the self-employed without changing the financing rules would lead to a massive redistribution from the poor workers to the "rich" people with little labour income.[7]

[7]There are, however, some cases where non-earnings income is subject to sickness fund contributions. In Germany this applies, for example, to voluntarily insured pensioners.

5. In addition, there can be implicit transfers from the insured in the private health insurance sector to the members of public health plans if the former have to pay higher prices for identical services than the latter (as e.g. in Germany).

It is easy to see that the extent of income redistribution inherent in public health care financing is a multidimensional matter so that it is not easy to rank the countries with respect to this criterion. Yet, it appears that those systems can be called "least redistributive" in which parts of the population are exempted, the dominant financing source are contributions and earnings are included only up to a (low) ceiling. Thus obvious candidates for the bottom places are Germany and the Netherlands, whereas the label "most redistributive" seems to belong to the all-tax-financed Denmark followed by Finland, Portugal, Sweden and the U.K. with heavy tax financing, no ceilings and no exemptions.

These findings are in general confirmed by the progressivity indices calculated in Wagstaff et al. (1999, Table 6) for the publicly financed health expenditures: Netherlands and Germany have a negative index, whereas the values are positive for all five countries mentioned above which rely heavily on tax financing. The ranking of index values derived from this quantitative analysis is, however, different from our broad categorization. For example, according to Wagstaff et al. (1999, p. 284) the Danish system of health care financing is less progressive (redistributive) than that of Portugal, Spain or the U.K., because a major source of funding is a near-proportional local income tax.

3 Efficient consumption of health services

In this section we analyze the extent to which alternative schemes of financing health care allow to incorporate incentive-compatible mechanisms that avoid the over-consumption of health services typical for a full-insurance system.[8] For this purpose we adapt a model of redistributive health care insurance in Breyer (1991), where the insured can choose a proportional copayment on all their health expenditures in case of illness. In contrast to Breyer (1991), we allow for a large number of households and focus on income redistribution, rather than redistribution between different health risks.

[8] A careful and thorough analysis of this overuse is found in Manning et al. (1987).

There are n households ($i = 1, ...n$) which differ in their labour earnings w_i, where $\bar{w}$ denotes average earnings.[9] For each individual, there are two possible states of the world ($j \in \{s, h\}$): it will be sick (superscript s) with the exogenous probability π, and healthy (superscript h) otherwise. Importantly, we assume that all individuals face the same probability of being sick. There are two goods, a composite health good x and a general consumption good y. Abstracting from price changes, we can measure both goods in appropriate units so that their producer prices are unity. Hence the marginal rate of transformation between goods x and y is also equal to one. Each household has to make two decisions: (1) what amount of health goods to consume in case of illness, and (2) which rate of copayment to choose in the insurance plan.

We make the following assumptions with regard to the expected utility function $E(U_i)$ of household i. In case of good health utility depends only on general consumption y_i, whereas in case of illness utility depends on general consumption and the consumption of health goods x_i. We assume that utility is additively composed of the subutility function $u(y_i)$ for general consumption goods and a subutility function $v(x_i)$, which describes the disutility from being sick. By consuming health goods this disutility can be reduced, but marginal utility gains are decreasing in x_i. Furthermore, utility from general consumption is also strictly concave in y_i, implying risk aversion. The properties of the two subutility functions are thus

$$u'(y_i) > 0,\ u''(y_i) < 0; \quad v'(x_i) > 0,\ v''(x_i) < 0. \tag{1}$$

The expected utility function of household i is then given by

$$\begin{aligned} E(U_i) &= \pi \left[u(w_i - P_i - T_i - c_i x_i) + v(x_i)\right] + (1 - \pi)\, u(w_i - P_i - T_i) \\ &= \pi \left[u(y_i^s) + v(x_i)\right] + (1 - \pi)\, u(y_i^h), \end{aligned} \tag{2}$$

where P_i denotes the insurance contribution, T_i are general taxes (or transfers, if negative), c_i is the copayment rate chosen by household i in the proportional coinsurance plan, and y_i^j is general consumption in health status $j \in \{s, h\}$.

The first decision made by each household is to choose the consumption of health goods x_i in case of illness, given the copayment rate decided on before the resolution

[9] For simplicity, we abstract here from other sources of income. Non-labour income will, however, play an important role in our analysis in the following section.

of uncertainty. Differentiating (2) with respect to x_i gives the first-order condition

$$\frac{v'(x_i)}{u'(y_i^s)} = c_i. \tag{3}$$

Household i equates the marginal rate of substitution between x and y to the relative price that it faces. Given that the marginal rate of transformation between x and y is unity, private and social prices of the health good thus coincide only for $c_i = 1$. For any $c_i < 1$ the private costs of health care, as perceived by the insured person, are below their true social costs, implying overconsumption. Furthermore, differentiating (3) with respect to x_i and c_i and using the properties (1) shows that the demand for health goods by household i is unambiguously falling in the copayment rate c_i:

$$\frac{dx_i}{dc_i} \equiv x_i' = \frac{u' - c_i\, u'' x_i}{v'' + c_i^2\, u''} < 0. \tag{4}$$

Our analysis focuses on the second decision of each individual, which is the choice of the proportional copayment rate c_i. Differentiating (2) with respect to c_i and using the optimality condition (3) gives

$$\begin{aligned}\frac{\partial E(U_i)}{\partial c_i} &= -\left[\pi u'(y_i^s) + (1-\pi)u'(y_i^h)\right]\frac{\partial P_i}{\partial c_i} - \pi u'(y_i^s)\, x_i(c_i) \\ &= -E\left[u'(y_i)\right]\frac{\partial P_i}{\partial c_i} - \pi u'(y_i^s)\, x_i(c_i) = 0.\end{aligned} \tag{5}$$

The first term in (5) denotes the increase in expected utility due to the drop in the insurance premium when the copayment rate is raised by a marginal amount (as is shown below). The second term gives the corresponding loss in expected utility due to the increased copayment itself. In the optimum, both terms have to be equal.

To determine the optimal value of c_i, the insurance premium P_i has to be specified. We assume that the social insurance system is characterized by a balanced-budget constraint and consider two main cases, depending on whether pure income redistribution is effected through the general tax-transfer system or through health insurance premia. The latter case is further subdivided according to whether or not the choice of a proportional copayment also affects the redistributive part of an individual's overall health insurance contribution.

Case 1: Redistribution is confined to the tax-transfer system (expressed through the term T_i in equation (2)) and P_i reflects only the expected health expenditures of household i. Hence we get

$$P_i^1(c_i) = \pi\,(1 - c_i)\, x_i(c_i). \tag{6}$$

Case 2a: Redistribution is effected through the health-insurance system and the contribution is a proportion β of the household's earnings, where the coefficient of proportionality is linear in the expected health expenditures of household i. In this case we have

$$P_i^{2a}(c_i) = \beta\,(c_i)\,w_i, \quad \text{where} \quad \beta\,(c_i) = \pi\,(1-c_i)\,x_i(c_i)\,\alpha, \tag{7}$$

and α is a constant which adjusts to ensure that the overall budget constraint is always met.[10]

Case 2b: Redistribution is effected through the health-insurance system and the contribution is composed of the expected health expenditures of household i and a net tax or transfer which depends only on the earnings of household i. Hence

$$P_i^{2b}(c_i) = \pi\,(1-c_i)\,x_i(c_i) + f\,(w_i), \quad f'(w_i) > 0. \tag{8}$$

We first turn to Case 1 and analyze the response of the insurance premium to a change in the individual copayment rate. Differentiating (6) with respect to c_i gives

$$\frac{\partial P_i^1}{\partial c_i} = \pi\,[(1-c_i)\,x_i'(c_i) - x_i(c_i)] < 0. \tag{9}$$

The first term in the squared bracket gives the reduced health expenditures if the coinsurance rate is raised [cf. eq. (4)], whereas the second term gives the value of the increased copayment itself. Both terms are negative, implying that in an insurance market with actuarially fair contracts, the premium of household i must fall *more than proportionally* as c_i increases.

It is then straightforward to show that full insurance ($c_i = 0$) can never be optimal (cf. Zweifel and Breyer 1997, p. 194). By inserting (9) into (5) and noting that $y_i^s = y_i^h$ in this case and thus $E\,[u'(y_i)] = u'(y_i^s)$, it is easy to see that the first term exceeds the second by $-E\,[u'(y_i)]\,\pi\,x_i'(c_i) > 0$. This term reflects the first-order welfare gain from reducing the overconsumption of health services, whereas there is no first-order efficiency loss from a *marginal* reduction of insurance when $c_i = 0$ initially. Hence, assuming that the second-order conditions for a maximum are fulfilled and $E(U_i)$ is concave in c_i, expected utility is maximized at a strictly positive level of c_i.

[10] In the special case where all households choose the same copayment rate, it is easy to check that $\alpha = 1/\bar{w}$.

Consider now Case 2a. Differentiating (7) with respect to c_i gives

$$\frac{\partial P_i^{2a}}{\partial c_i} = \pi \ [(1 - c_i)\, x_i'(c_i) - x_i(c_i)] \ \alpha \, w_i. \tag{10}$$

Inserting (10) into (5) and comparing the result with the one obtained for Case 1, it is seen that the choice of the copayment rate is now affected by the individual's relative income position. In comparison to Case 1, a marginal increase in the copayment rate will lead to a reduction in the insurance premium that is

(a) larger for households with earnings $w_i > 1/\alpha$,

(b) smaller for households with earnings $w_i < 1/\alpha$.

Thus there is an earnings threshold $w^* = 1/\alpha$ with the property that all households with earnings above w^* choose an inefficiently high rate of copayment whereas all households with earnings below w^* choose an inefficiently low rate. Intuitively, in this case there is an incentive for rich households to expand their coinsurance rate beyond the level that would be chosen under a fair premium because copayments are a way to reduce the redistributive burden associated with the social health insurance system. Conversely, households with low earnings have an incentive to choose a lower rate of coinsurance than the efficient one because their premium is subsidized.

As a result, almost all households choose an inefficient level of insurance coverage if this choice has an impact on the amount of net transfers one has to pay into the "redistributive account" of social health insurance. Given these distortions, it is not surprising that redistributive insurance schemes in general fix the level of copayment institutionally, often at zero.[11] The efficiency costs of the latter restriction then follow immediately from our previous result that the optimal level of c_i is strictly positive.

Finally, in Case 2b redistribution occurs within the health care system, but copayments do not alter the level of transfers paid or received. Different variants of this scheme have been proposed in the literature. The 'health care prototype' proposed by Hoffmeyer and McCarthy (1994, pp. 26-37) combines income-related premiums paid to a central, redistributive fund with risk-related premiums paid to a private insurance company chosen by the individual. Under an alternative scheme, which has long been advocated in Germany (see Männer 1989; Advisory Council for the Concerted Action in Health Care 1995), insurance contributions are analytically

[11] In Germany, for example, no copayments exist for the services of physicians and only negligible ones for hospital care.

decomposed into a "risk-equivalent" and a redistributive component. Finally, Pauly et. al. (1991) have argued in favour of lump-sum transfers from the government to high-risk individuals, compensating them for the extra costs of chronic or severe diseases.[12] In all these cases, copayments will thus lead to a proportional reduction in the pure risk premium only.

In our framework of pure income redistribution, it is easy to see that this case is analytically equivalent to Case 1 and thus is indeed compatible with efficient insurance contracts. Differentiating (8) with respect to c_i yields the same result as in (9) because the risk equivalent and the redistributive term are fully separated. Hence, in the setting of this section, each household is indifferent between paying or receiving a given transfer either through the general tax system or through the system of social health insurance.

Recall, however, that we have assumed for simplicity that all individuals face the same probability of getting sick. Hence our analysis above has excluded the simultaneous redistribution between different health risks that occurs in actual health care systems. The covariance between income and health risks is at the heart of the analyses of Blomqvist and Horn (1984), Rochet (1991), Cremer and Pestieau (1996) and Petretto (1999), who extend the theory of optimal income taxation by incorporating a redistributive health care system. In these models social insurance for health care works like a specific subsidy for health consumption whereas the income tax system leads to a general subsidy to the poor. Concentrating on the case of a linear income tax, income redistribution through the health care system will be chosen in the optimum, if and only if low incomes are associated, on average, with an increased probability of sickness and hence health good consumption. As pointed out by Petretto (1999, p. 741) there is a direct analogy to the theory of optimal redistributive taxation when both direct and indirect (specific) taxes are available. For the case of a linear income tax, the conditions for specific taxes (or subsidies) to be zero in the optimum are that preferences are separable in goods and leisure, and that Engel curves are parallel and linear (cf. Atkinson and Stiglitz 1976, Deaton 1979).

Extending the analysis to account for redistribution between different health risks may also affect private health care decisions, on which our above analysis has focused.

[12] A specific problem with the last plan is, however, that the long-term costs of a given health status may be very difficult to anticipate (see Cochrane 1995).

In particular, it must be asked how coinsurance options to reduce moral hazard can be incorporated without giving incentives to low-*risk* individuals to strategically increase the copayment rate in a way analogous to the one shown above for high-*income* individuals. In the extreme, this could lead to a total separation of risk groups, which would eliminate the desired redistribution from good to bad risks. A solution proposed in Breyer (1991) consists in a fixed coverage level $(1-c)$ for all social health insurance plans specified by the regulator, for example 80 per cent. Since there is mandatory membership, this rate serves as a minimum coverage level. Community rating within each of these basic insurance plans then assures a certain extent of redistribution between risk groups. Individuals are allowed to purchase supplementary coverage and since bad risks will be much more likely to do so, there will be very little (additional) redistribution through these plans. Nevertheless, it can be shown (ibid., pp. 128 ff.) that even bad risks who choose full supplementary coverage for themselves may be better off in such a system than under mandatory full coverage, if the price elasticity of demand by the good risks – and hence the efficiency gain from the reduced overconsumption of health services by this group – is sufficiently large.

4 Efficient financing of income redistribution

We now shift our attention to the financing of income redistribution via the health care system vs. the general tax system. As we have seen in Section 2, all EU countries except Denmark use wage-based contributions to finance at least some part of their redistributive health care systems. Together with the redistributive goals of the general tax system, income redistribution is currently carried out using two instruments which differ in the relevant tax bases and rate schedules and thus imply potentially diverging marginal welfare costs. In the following we will argue that an exclusive reliance on tax-financed redistribution is likely to imply a lower excess burden as compared to a partial financing through wage-based insurance contributions.

To make the basic argument, we concentrate on a two-person framework $i \in \{1,2\}$ and assume that the 'poor' household 2 has no income of its own and its entire consumption of health goods and general consumption is financed by the 'rich' household 1. Furthermore we neglect any copayment choices and fix the levels of both $\bar{x}_2$ and $\bar{y}_2$, in line with the requirement that a reform of health care financing

should not affect the extent of income redistribution associated with the current mix of tax and social security financing. With these assumptions the model reduces to a conventional one-consumer optimal tax problem which tries to minimize the welfare costs to household 1 of effecting a given volume of income redistribution $(\bar{x}_2 + \bar{y}_2)$.

We assume a standard two-period framework where the rich household 1 faces both an intertemporal consumption decision and a labour supply decision. In period 1 the household is given an endowment e_1, which can either be consumed or saved. Savings are invested in the world market at a fixed interest rate r. For notational simplicity, and without altering any of the results, production occurs in period 2 only. Household 1 supplies an endogenous amount of labour l_1 (thus receiving wage income $w_1 l_1$), and a fixed amount of land, which receives the fixed rent income m_1.

The set of instruments available to the government is decribed as follows. Corresponding to general practice in most countries, the social security contribution is a fixed proportion s of gross labour income.[13] With respect to the tax system, we consider a general and uniform consumption tax that, as we will see below, can alternatively be interpreted as a proportional direct tax (expenditure tax). This tax, denoted by t, does not distort the rich household's intertemporal consumption pattern, but we will verbally extend our discussion to incorporate an additional tax on savings. Finally, we ignore here the (fixed) fair premium that the rich household pays for its own health insurance, since this will be financed by health insurance under any of the cases considered here. This implies that both s and t can be interpreted as tax rates levied for redistributive purposes only.

Using these assumptions, it is straightforward to set up household 1's intertemporal budget constraint. In present value terms (i.e., discounting second-period income and consumption by the factor $1 + r$), this is

$$e_1 + \frac{(1-s)\, w_1\, l_1}{(1+r)} + \frac{m_1}{(1+r)} = (1+t') \left[y_1^1 + \frac{y_2^2}{(1+r)} \right], \tag{11}$$

where y_1^1 and y_1^2 are household 1's consumption levels in periods 1 and 2, t' is the ad valorem consumption tax and s is the rate of the social security contribution.

Dividing (11) through by $(1 + t')$ and introducing $t \equiv t'/(1 + t')$ shows that a general consumption tax at rate t' is equivalent to a proportional tax t on all income

[13] We initially abstract from income ceilings in assessing the contributions to the health care system. This feature of existing financing schemes will be discussed at the end of the section.

sources except the normal return to capital (expenditure tax):

$$(1-t)\left[e_1+\frac{(1-s)\,w_1\,l_1}{(1+r)}+\frac{m_1}{(1+r)}\right]=y_1^1+\frac{y_1^2}{(1+r)}. \tag{12}$$

Implicit in this private budget constraint are aggregate social security contributions S_1 and tax receipts T_1 defined by

$$S_1=\frac{s\,w_1\,l_1}{(1+r)},\qquad T_1=t\left[e_1+\frac{(1-s)\,w_1\,l_1}{(1+r)}+\frac{m_1}{(1+r)}\right]. \tag{13}$$

The rich household maximizes the utility function $u_1(y_1^1,y_1^2,l_1)$, subject to the budget constraint (12). This yields the indirect utility function $v_1\left[(1+r),\omega_1,(1-t)\,M_1\right]$, where we have defined

$$\omega_1\equiv(1-t)\,(1-s)\,w_1\quad\text{and}\quad M_1\equiv e_1+m_1/(1+r). \tag{14}$$

The first argument in v_1 is the price of period 1 consumption, which remains unchanged in our analysis and hence will be omitted in the following. The second argument is the net wage (or the price of leisure) and the third argument is household 1's net *exogenous* income.

We consider again two main cases, depending on whether household 1's redistributive payment for household 2's health consumption ($\bar{x}_2$) is financed through the general tax system (Case 1) or through household A's health care contribution (Case 2). Note that Case 2 now incorporates both Cases 2a and 2b discussed in the previous section.

Case 1: The poor person's health expenditure ($\bar{x}_2$) and its general consumption ($\bar{y}_2$) are both paid through the tax system. Using (13) and (14) we get

$$\begin{aligned} s&=0,\\ t\;[w_1\,l_1/(1+r)+M_1]&=\bar{x}_2+\bar{y}_2. \end{aligned} \tag{15}$$

Case 2: The poor person's health expenditure is paid through the health care system whereas its general consumption is financed through the general tax system. This gives, using again (13) and (14)

$$\begin{aligned} s\,w\,l_1/\,(1+r)&=\bar{x}_2,\\ t\;[(1-s)\,w_1\,l_1/(1+r)+M_1]&=\bar{y}_2. \end{aligned} \tag{16}$$

To see which of the two ways of financing $\bar{x}_2$ is efficient, we set up an optimization problem in which the indirect utility of the rich household is maximized, subject to the redistribution constraint, and endogenize the levels of both variables s and t. Furthermore, we incorporate Kuhn-Tucker multipliers $\mu_s \geq 0$ and $\mu_t \geq 0$, which allow for the possibility that one of the two tax rates is zero in the optimum. Adding up S_1 and T_1 in (13) and using (14) gives the Lagrangean

$$\mathcal{L} = v_1 \left[\omega_1, (1-t)\, M_1 \right] + \lambda \left\{ \left[t\,(1-s) + s \right] w_1\, l_1(\omega_1)/(1+r) + t\, M_1 - (\bar{x}_2 + \bar{y}_2) \right\} + \mu_s\, s + \mu_t\, t.$$

Differentiating with respect to the two instruments s and t, normalizing the marginal utility of private income to unity and using Roy's theorem yields:

$$\frac{\partial \mathcal{L}}{\partial s} = (\lambda - 1)\, w_1\, (1-t)\, l_1 - \lambda \left[t\,(1-s) + s \right] (1-t)\, w_1^2\, \frac{\partial l_1}{\partial \omega} + \mu_s = 0, \tag{17}$$

$$\frac{\partial \mathcal{L}}{\partial t} = (\lambda - 1) \left[w_1\, (1-s)\, l_1 + M_1 \right] - \lambda \left[t\,(1-s) + s \right] (1-s)\, w_1^2\, \frac{\partial l_1}{\partial \omega} + \mu_t = 0, \tag{18}$$

$$\mu_s\, s = 0, \tag{19}$$

$$\mu_t\, t = 0. \tag{20}$$

To simplify this equation set, we divide (17) by $(1-t)$ and (18) by $(1-s)$ and subtract the resulting equations from each other. This yields

$$(\lambda - 1)\, \frac{M_1}{(1-s)} + \frac{\mu_t}{(1-s)} - \frac{\mu_s}{(1-t)} = 0. \tag{21}$$

Note that μ_s and μ_t are non-negative and $\lambda > 1$ must hold under distortive tax financing since the shadow price of tax revenue exceeds the private marginal utility of income. Furthermore, at least one tax rate must be positive to satisfy the (consolidated) government budget constraint, so either μ_s or μ_t must be zero. From these constraints, it is then immediately clear that only $\mu_t = 0$ and $\mu_s > 0$ satisfies equation (21). This implies from (19) and (20) that $s = 0$ and $t > 0$ in the optimum.

This result is easily explained by noting that the excess burden terms [the second terms on the RHS of (17) and (18)] are identical for both taxes, if corrected for the weights $(1-t)$ and $(1-s)$, respectively. However, the positive first term in (18) is larger than in (17) because the base of the general tax contains two lump-sum elements (summarized in the term M_1) which are absent under social security financing. Hence the shadow price of public funds is smaller under general tax financing

and it is optimal to rely exclusively on this instrument in order to finance income redistribution.

An important question remains, however, how large the exogenous income sources modelled here are likely to be in practice. In particular, it may be argued that the share of pure rent income in the economy (the term m_1 in the above model) is relatively small. However, a general consumption or expenditure tax that excludes the normal return to 'new' capital from taxation nevertheless imposes a tax on the stock of 'old' capital that is in place at the time when the tax is introduced (or the tax rate is increased). In our analysis, this initial capital stock corresponds to the endowment term e_1. It has repeatedly been emphasized that this tax base is substantial in present value for realistic capital-output ratios in developed economies (see Sinn 1987, Ch. 11; Frenkel, Razin and Yuen 1996, p. 388).

We would argue, therefore, that a switch to pure tax financing can indeed lead to a noticeable reduction in the tax burden on wage income and in the excess burden of financing a given level of income redistribution. We emphasize that under these conditions tax financing is welfare superior to *any* scheme that finances redistribution partly through wage-based social security contributions, including the case where insurance premia are decomposed into a risk component and a redistributive component. Hence, Cases 1 and 2b of the previous section are no longer equivalent when the differential efficiency effects of financing a given amount of income redistribution are taken into account.

So far, our discussion has been confined to a highly stylized tax, which was alternatively interpreted as a proportional direct tax on expenditures, or as a general consumption tax. Given the model implication that health care subsidies to poor households should be tax-financed, a relevant policy question is clearly whether this task should be performed by the value-added tax (VAT) or by existing income taxes, where the latter also tax the normal return to capital (r). It is well known from the analysis of Atkinson and Sandmo (1980) that the efficiency comparison between income and consumption (expenditure) taxes is fundamentally ambiguous, and the debate whether a distortive tax on savings should be added to the tax system in order to reduce the tax burden on labour continues to the present day. On the one hand, the "flat tax" proposed for income tax reform in the United States (Hall and Rabushka 1995) exempts the normal return to capital completely from tax and corresponds quite closely to the tax modelled above. On the other hand,

many European observers see the "dual income tax" of the Scandinavian countries as an attractive alternative to the complete exemption of interest income, since the efficiency costs of labour taxation are considered to be very high.[14]

While this efficiency comparison is both complex and controversial, the different *distributional* implications of income and consumption taxes may offer a more clear-cut answer to the policy question addressed here. Income tax schedules are typically progressive while VAT is a (largely) proportional tax on consumption. Given that health care contributions are also proportional levies, a switch to VAT financing of health care subsidies is thus likely to imply fewer redistributive effects than if income taxes were used instead. Nevertheless, some redistribution will occur in those countries which currently have annual earnings ceilings for contributions, above which the marginal contribution rate is zero (see Table 1). In those countries, switching to a proportional consumption tax would eliminate this "regressive" feature of current health care financing and would be equivalent to raising the income ceiling. Hence the efficiency gains discussed above would be accompanied by redistributive effects that would generally favour low income earners while imposing an extra burden on high income earners. To the extent that these effects are considered as significant and undesirable, they would have to be compensated by reducing the degree of progressivity elsewhere in the tax system.

5 Conclusions

Most systems of health care financing in the European Union and elsewhere currently include a substantial amount of income redistribution, which has developed from historical shifts in the insurance role of health care systems. This paper has advanced two arguments in favour of shifting the role of income redistribution entirely to the general tax system, thus applying to health care finance the basic Tinbergen rule that each instrument should be targeted at the policy goal where it has the greatest

[14]Under the dual income tax, capital income is taxed at a lower rate than wage income, but capital tax rates still range between 20 and 30 per cent. See Sørensen (1994) for an introduction to the Nordic tax reforms and Cnossen (1999) for a recent discussion of whether the dual income tax could serve as a model for the European Union. Koskela and Schöb (1998) show that there can be efficiency gains from taxing capital even in a world of perfect international capital mobility, if the labour market is characterized by involuntary unemployment.

direct effect. On the one hand, we have argued that this reform would facilitate the adoption of health insurance contracts – for example copayment schemes – that reduce the incentives for individuals to 'overconsume' health services. On the other hand, financing income redistribution solely through the general tax system is also likely to reduce the excess burden of taxation by shifting some of the tax burden from labour to immobile tax bases, such as rent income and the existing capital stock.

By combining both sets of arguments, it is possible to rank alternative solutions to health care financing which are equivalent in more narrow settings. For example, the Danish system of financing the entire health budget through taxes is potentially efficient on the revenue side, but does not allow for cost-cutting incentives on the expenditure side. A similar argument applies to proposals to extend the base on which health care contributions are calculated. Conversely, the different proposals to split up existing health care premia into a risk equivalent and a redistributive element are aimed at improving the efficiency of the expenditure side of the health care system, but income redistribution would likely remain to be financed in an inefficient way.

In the political debate the idea of shifting pure income redistribution to the tax system is often not clearly separated from the proposal to eliminate the redistributive component of social health insurance completely by calculating actuarial premia (cf. Sachverständigenrat, 1996, p. 250). It needs to be stressed that the latter position is not taken here. While we have not modelled differences in health risks in this paper, our analysis is nevertheless based on the presumption that redistribution between different health risks may be explicitly desired by society, and impossible to achieve via lump-sum transfers. Therefore, redistribution between different health risks would remain in the social health insurance system and would be effected through identical per-capita contributions (community rating) for the mandatory benefit package.[15]

Finally, the limitations of our analysis need to be emphasized. Firstly, apart from the fundamental moral hazard problem we have not considered other sources of inefficiencies in the market for health care, such as imperfect information on the part of consumers, or a non-competitive supply of health services. Clearly, these are

[15]This proposal was discussed in one of the latest reports by the German Advisory Council for the Concerted Action in Health Care (1997), but dismissed as "too unrealistic".

important factors in an overall policy programme to improve the efficiency of health care provision, but they need to be studied in detail in other contributions. Secondly, this paper has not questioned the extent of income redistribution inherent in the current combined tax and social security system. Instead, our analysis has explicitly assumed that the total level of income redistribution is kept constant. The equity and efficiency effects that would arise from a *reduction* in current levels of income distribution – caused, for example, by increased international mobility of factors of production – are a separate issue that is beyond the scope of the present paper (see Sinn, 1996, for a detailed analysis). Lastly, and perhaps most importantly, it is worth repeating that this paper has adopted a policy-oriented approach that is complementary to existing analyses of optimal redistribution cum social insurance. Incorporating the arguments made here into a rigorous and unified optimal taxation framework is a task that we leave for future research.

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